

NOTES ON WESTERN AUSTRALIAN ANT-NEST BEETLES.

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(Read 11th May, 1920.)

With a view to encouraging Nature Study in general, and Entomology in particular, I would like to draw the attention of the members of our Society to a large field for observation that exists in this State.

Amongst the insects of Western Australia are many large, handsome, and remarkable species, which are much sought after by Naturalists, but none so remarkable, though small, than those which spend all or part of their lives in the nests of ants and white ants. The majority of insects found in ants' nests are beetles, but representatives of many other orders are found.

Mealy-bugs are plentiful, a few species of true bugs, at least two species of flies, and many lepidopterous larvae are to be taken in nests about Perth. Spiders, mites, wood-lice, and chelifers abound in most nests which have been long established.

It is unnecessary to go into detail of all the species of insects found in ants' nest, as a most interesting paper by Mr. A. M. Lea was published in the Victorian "Naturalist" (Volume XXVII., 3, 1910, pp. 50-56) dealing with this subject.

A great deal has been done in the Eastern States in connection with this branch of Entomology, but comparatively little has been done here, and no observations have been made on the life history of any of the species so found in this State, so that a great field awaits the Naturalist here for there is an abundance of material to work on, and the ease with which it can be obtained must appeal to many when they realise the interest of the work.

One of the nests about Perth which generally contains a number of guests, or inquilines, is that of the twig mound ant, *Iridomyrmex conifer*, Forel., and from it many remarkable insects have been taken.

The nest is productive at all times of the year, but gives the best results during May to October. This ant shows remarkable building ability and foresight; the nests being built up of twigs, grass, leaves, etc., are very easily destroyed by bush fires which are general during the dry months of the year, and it is a very common sight to see many of these burned out nests during a walk in the bush. On the approach of summer the ants, apparently aware of the danger, forsake their mound nest, seek a clear open space and there excavate a nest underground. The summer and winter nests are so dissimilar as to appear to be the work of two different species of ants, one a builder, the other a miner.

The size and position of the nests of this ant vary considerably. In some localities it is difficult to find a nest more than nine inches

high, and about twelve inches wide at the bottom, while in other places they reach eighteen inches in height, and twenty to twenty-six inches in width at the bottom. Most of the large nests have been built up round a small plant or other support, while the smaller nests are usually in open country with no support. On several occasions nests have been observed under half buried logs and stumps, with little or no twig mound over them, the few twigs, etc., brought together only serving to cover the various entrances to the nest.

The site of the summer nest is usually in a position shaded from the heat of the sun; it is a basin-shaped excavation, generally about six inches deep and fourteen to eighteen inches in diameter, divided into several chambers or compartments. These contain the different stages of larvae and pupae. The top chambers are usually about three inches below the surface of the ground. The material excavated is carried clear of the nest, and deposited round the outside, giving the nest a sunken appearance. Entrance is gained at several points, but the main one is usually about the centre.

The twig or mound nest is sometimes built up over the summer nest, but at other times a new nest is constructed, usually at the foot of a small plant, or in an old root underground. The average nest is about ten or twelve inches high, and about sixteen to eighteen inches in diameter, at the surface of the ground. Building is commenced by arranging long twigs and bits of grass, round and about the central entrance, many ants often working with one piece of twig until it is got into position. Each ant usually works alone with its twig until the nest is reached, when others assist to carry or drag the piece into position. Soil and other material excavated is laid on and covers the twigs for about one-third of the height of the mound, making the building more secure: entrance is gained at many points round and on the mound, but there always appears to be a main entrance, round which many ants gather as though keeping guard.

While many ants are excavating, others are carrying twigs, grass, leaves, etc., and others carrying and depositing their burden of larvae and pupae, the whole representing a very busy scene.

The arrangement of the larvae and pupae in this nest is very similar to the summer nest, but the chambers are larger and fewer. Two queens have at various times been taken in one nest. They are always at the bottom and do not appear to occupy any particular chamber. Several small chambers containing eggs are also at the bottom, but these are often to be seen in topchambers. They are small whitish objects, and usually in large numbers. The larvae are small and of a yellowish colour. They are found in various parts of the nest: the pupae are naked and usually occupy the centre chambers.

Large numbers of larvae and pupae of winged males and females are sometimes to be found in nests, the sexes being about equal in numbers. The large female is fully twice the size of the male and the workers, who are both of the same size (5 mm.). The antennae, however, are totally different; in the female and the workers this is twelve jointed, the scape being equal in length to the following seven joints of the funiculis which has eleven joints subequal: the antennae of the male has thirteen joints, and the scape only the length of the following two joints, and the third only half the length of the fourth.

The colour varies slightly, but generally the head and thorax are of a dull brownish tinge, and the abdomen black; many freshly emerged specimens can always be taken in the nests and these are of a light grey colour.

A most peculiar odour pervades the nests, and when disturbed, can be noticed for some distance. The smell does not arise from the material of which the nest is composed, as the summer nest which contains no vegetable matter gives off the same powerful odour.

During the removals from one nest to the other none of the intruding beetles and other insects have been seen amongst the quick-moving columns of ants, each with its burden of larva or pupa, but on digging out and examining many such nests, many of the guest insects have been obtained. In searching this nest for inquiline it has been found that very few species are to be obtained in the mound or twig portion, the only one so far recorded being the large *Cryptodes variolosus*, but on removing the top the whole nest is exposed showing large numbers of larvae and pupae. It is amongst these, and in this region that all or most of the guests will be found. It is here also where the observer has to be quick. These ants do not sting, but they bite (and are generally in a hurry to do it) and on the least alarm they swarm out in thousands, attacking everything in the way, so that examining this nest in the bush is a very difficult matter, the more so as most of the species are small and slow movers.

The following method was therefore adopted for dealing with them and answers well. On finding a well-built nest in which the ants are very active, a clear spot is selected alongside on which to stand. A large paper or calico bag is placed alongside: the bottom of the nest is first dug into with a small shovel, letting the top fall to the ground when lifting, quickly dropping the lot into the bag. The whole nest is taken and the bag securely fastened. While digging it is necessary to keep stamping the feet to keep the ants off.

On arrival home the nest is put in a kerosene tin, or other smooth container on which the ants will not climb, preparatory to sieving. Three sizes of sieves are used, the largest one being quarter-inch mesh, which is used to remove the rubbish, leaves,

sticks, and stones. As a rule no beetles will be found in this material, except the large *Cryptodus*, which is about three-quarters of an inch long, so that it can easily be seen. Large numbers of this species can often be taken from a single nest. The next size sieve is one-eighth of an inch mesh (or the size of fly screen wire): everything that does not pass through it is treated as large or No. 2. The last sieve is fine and is used to clear off the fine dust, which seldom contains anything except the smallest mites; the material from this sieve is treated at No. 3, and the dust as No. 4. These are all sieved into separate tins and kept apart until examined. Two large-sized tubs are required for further examination. In one of these a kerosene tin is laid on its side, and a board with a sheet of white paper placed on top, makes an excellent though small observation table. The large (No. 2) material is examined first, by taking a little on a trowel and sprinkling lightly over the paper. At first nothing will be seen but hurrying ants. These run to the edge of the paper and drop into the tub, and owing to the very smooth surface they cannot climb out. In a few moments many of the other insects start to move, and are soon detected and transferred to the tubes. In this material all the larger species will be found, such as *Enasiba* and *Chlamydopsis*, so that little time need be spent in examining it. As most, if not all of the ants will have disappeared from the paper, the contents are thrown into the clean tub kept ready for the purpose. This is continued until the whole of the material has been examined, and by throwing it into the spare tub, it can be looked over some hours afterwards, for it will be found that several specimens have remained so quiet as to escape detection, but on being left alone for a time, these burrow to the surface in their efforts to get away. Some fine and rare species may be taken in that way.

The medium material (No. 3) contains most of the species to be found in these nests. Some, such as *Articerus* and *Ectrephes*, move off at once on being placed on the paper, but others such as *Euclarkia* and *Thorictosoma*, will not move for some time, and must be searched for. The best way to pick them off the paper is to dip a small fine pointed brush in spirits, and touch the specimen lightly; it will adhere and can then be transferred without injury which would otherwise result if lifted by forceps. Specimens of the ants should always be placed in the spirit tubes with the other insects, and when all such specimens are mounted on cards, a second card with specimens of the ants should be placed on the same pins, under the beetles. This not only adds interest to a collection, but is necessary to prevent confusion which would otherwise result.

In addition to the many species of insects which are known to be constant visitors to ants nests several species will be found at times, whose presence in nests would seem to be either accidental, or because they are victims of the ants. Several such have been

taken with this ant, but as nothing definite has been obtained about them, they are, for the present, excluded from the list. Large numbers of larvae of various insects are often met with during examination of material, but trouble is generally experienced in rearing these to maturity owing to the difficulty of ascertaining what they are living on. The full grown larva of a moth, and also some syrphid flies have been reared, but these have not been definitely identified yet.

At present several pupae of moths are under observation. They are the first of many to pupate. These will be dealt with in a later part of this series.

COLEOPTERA FROM NEST OF IRIDOMYRMEX CONIFERA (FOREL).

CARABIDAE.

Adelotopus occidentalis, Cast, Perth.

A small shiny black beetle, which at first glance looks more like one of the small Water-beetles than a Carab. It is an extremely quick moving species, and easily evades capture. This beetle is carnivorous and feeds on ants away from their nests. It can also be found under loose bark, stones, etc., where there are no ants.

STAPHYLINIDAE.

Several new and interesting species of this family have been taken, allied to the European genus *Dinarda*, about which so much has been written. They will be dealt with later.

PSELAPHIDAE.

Pselaphus tuberculifrons, Lea, Perth.

Eupines sulcata, Sharp, Perth.

Palimbolus dimidiatus, Raff, Perth.

Articerus foveicollis, Raff, Perth.

Articerus subcylindricornis, Lea, Perth.

The members of this family feed on the mites which are abundant in most nests. With the exception of the species of *Articerus*, most of the family occur rather sparingly. They are all small and of a reddish-brown colour. They move about amongst the ants in a most friendly manner. The species of the genus *Pselaphus* have the palpi almost or quite as long as the antennae, while those of the *Articerus* are remarkable for each antenna being apparently composed of one long joint, although there are really two, and for the apparent absence of palpi. *A. foveicollis* is abundant in most nests, while *A. subcylindricornis* is rare.

SCYDMAENIDAE.

Scydmaenus opatus, Sharp, Perth, Victoria Park.

This beetle occurs rather sparingly, and like the members of the preceding family, feeds on mites.

HISTERIDAE.

Chlamydopsis inquilina, Lewis, Perth, Canning River.

This species is most abundant in nests from the Canning River District, although it has been taken in many places about Perth. The type was taken by the late Mr. F. H. Du Boulay, thirty years ago, and was recorded as from New South Wales. It has been noted by Mr. A. M. Lea that this is probably an error, as Mr. Du Boulay did a lot of collecting from ants nests in Western Australia, and not in N.S. Wales. The fact that so many specimens have been obtained here supports his view, as apparently no specimens have been taken in N.S. Wales. The species of this genus are extremely rare, and are probably all hostile to the ants. They are remarkably sculptured beetles, and when at rest have the head withdrawn into the thorax, with the basil joint of the antennae fitted into grooves, and some of the legs also packed into grooves or otherwise protected.

COLYDIIDAE.

Euclarkia costata, Lea, Victoria Park, Jandakot.

A recently described and remarkable species which occurs in numbers in some nests. This beetle is easily overlooked, as it closely resembles the material of which the nest is composed, and it remains motionless for a long time. It can, however, move very quickly when it starts. It is remarkably close to a Victorian species of the family, *Kershawia rugiceps*, Lea, but has totally different antennae. At first sight the antennae seems one-jointed and look as if they were broken off. They are really three-jointed (in *Kershawia* they are nine-jointed). The species vary in colour from light brown to almost black, and have wings.

SCARABAEIDAE.

Cryptodus variolosus, White, Perth.

One of the largest beetles found in ants nests. It is three-fourths of an inch long. As the mouth parts of all the species are curiously modified they are probably all hostile to the ants. This species can be taken in numbers in most nests.

ELATERIDAE.

Cardiophorus sp., Perth, Maylands.

Several specimens of a small unidentified species of this genus have (so far only) been found in these nests. These will be dealt with later.

TENEBRIONIDAE.

Thorictosoma ectatommae, Lea, Perth, Canning River.

An interesting and recently described species, which has been taken in the nests of three species of ants, but never numerous. This beetle has no sign of eyes and is wingless—it is a very slow mover and has to be well looked for.

A second species *T. tibiale*, Lea, was taken at Geraldton by Mr. A. M. Lea, who considers it probable that it is an ants nest species. It is closely allied to *T. ectatommae*.

Hyocis. sp., Mt. Lawley, Maylands.

Several specimens of a small species have been obtained. They are also to be taken in nests of *Cremastogaster*, but are not numerous. They will be dealt with later.

Ectyche erebea. Pasc., Perth.

This species occurs frequently in nests, but can also be taken in numbers under stones, logs, etc., where there are no ants. They have frequently been watched running about amongst the ants in a friendly manner.

PTINIDAE.

Diphobia longicornis, Lea, Victoria Park.

A recently described species of which very few specimens have been obtained. They are all from the same locality.

Diplocotes foveicollis, Oll. Perth, Serpentine River.

Several specimens have been taken in nests. This species was first described from New South Wales.

Ectrephes formicarum, Pasc., Perth, Jandakot.

This species is numerous in most nests, and is very variable in size. The peculiar antennae look different from different points of view. Four species of this remarkable genus are recorded from W. Australia.

Enasiba tristis, Oll., Perth.

This remarkable and rare beetle has been taken in a few places about Perth, but only in nests of this ant. The type and only specimen was taken at King George's Sound many years ago, and remained unique until quite recently. It is regarded as the finest of our Western Australian ants-nest beetles; the peculiar antennae look very different when viewed from the top and from the side. The specimens vary much in size and colour, and as they are very slow movers, they easily escape detection. Most of the specimens have been taken in the tub after the material had been examined on the paper.

Hexaplocotes sulcifrons, Lea, Perth, Beverley.

Very few of this remarkable species have been taken at Perth, but Mr. Du Boulay took several specimens in nests at Beverley. Its antennae are remarkable, seen from the top, the two apical joints are greatly produced transversely, giving it a disc-like appearance, but when viewed from the side they appear normal.

CURCULIONIDAE.

Several species have been found, but most of them appear to be accidental or victims of the ants. One small species occurs, which, so far, has only been taken in nests ; it has large projecting eyes, and is rather an interesting weevil. This will shortly be described by Mr. A. M. Lea.

ANTHICIDAE.

Anthicus australis, King, Perth.

This species is occasional, and is found in the nests during wet weather, but is never numerous.

In addition to the beetles mentioned several others have been taken, but as they have not yet been identified, or are doubtfully connected with the ants, they will be dealt with in a later part of this series.
